

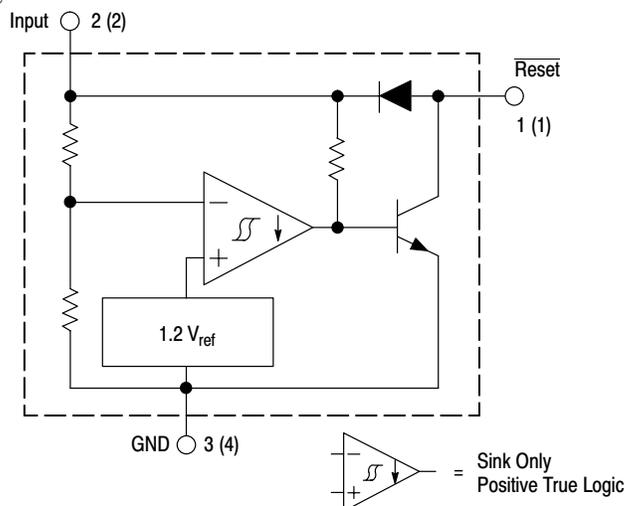
MC34064, MC33064, NCV33064

Undervoltage Sensing Circuit

The MC34064 is an undervoltage sensing circuit specifically designed for use as a reset controller in microprocessor-based systems. It offers the designer an economical solution for low voltage detection with a single external resistor. The MC34064 features a trimmed-in-package bandgap reference, and a comparator with precise thresholds and built-in hysteresis to prevent erratic reset operation. The open collector reset output is capable of sinking in excess of 10 mA, and operation is guaranteed down to 1.0 V input with low standby current. The MC devices are packaged in 3-pin TO-226AA, micro size TSOP-5, 8-pin SO-8 and 8-pin SO-8 and Micro8 surface mount packages. The NCV device is packaged in SO-8 and TO-226AA.

Applications include direct monitoring of the 5.0 V MPU/logic power supply used in appliance, automotive, consumer and industrial equipment.

- Trimmed-In-Package Temperature Compensated Reference
- Comparator Threshold of 4.6 V at 25°C
- Precise Comparator Thresholds Guaranteed Over Temperature
- Comparator Hysteresis Prevents Erratic Reset
- Reset Output Capable of Sinking in Excess of 10 mA
- Internal Clamp Diode for Discharging Delay Capacitor
- Guaranteed Reset Operation with 1.0 V Input
- Low Standby Current
- Economical TO-226AA, TSOP-5, SO-8 and Micro8 Surface Mount Packages



Pin numbers adjacent to terminals are for the 3-pin TO-226AA package.
Pin numbers in parenthesis are for the 8-lead packages.

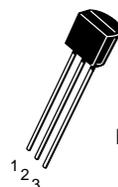
This device contains 21 active transistors.

Figure 1. Representative Block Diagram



ON Semiconductor®

<http://onsemi.com>



**TO-226AA
P SUFFIX
CASE 29**

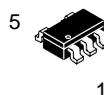
Pin 1. $\overline{\text{Reset}}$
2. Input
3. Ground



**SO-8
D SUFFIX
CASE 751**



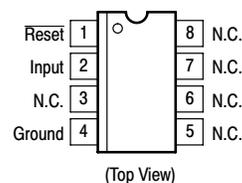
**Micro8
DM SUFFIX
CASE 846A**



**TSOP-5
SN SUFFIX
CASE 483**

Pin 1. $\overline{\text{Reset}}$
2. Input
3. Ground
4. NC
5. NC

PIN CONNECTIONS



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 7 of this data sheet.

MC34064, MC33064, NCV33064

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Power Input Supply Voltage	V_{in}	-1.0 to 10	V
Reset Output Voltage	V_O	10	V
Reset Output Sink Current (Note 2)	I_{Sink}	Internally Limited	mA
Clamp Diode Forward Current, Pin 1 to 2 (Note 2)	I_F	100	mA
Power Dissipation and Thermal Characteristics P Suffix, Plastic Package Maximum Power Dissipation @ $T_A = 25^\circ\text{C}$ Thermal Resistance, Junction-to-Air D Suffix, Plastic Package Maximum Power Dissipation @ $T_A = 25^\circ\text{C}$ Thermal Resistance, Junction-to-Air DM Suffix, Plastic Package Maximum Power Dissipation @ $T_A = 25^\circ\text{C}$ Thermal Resistance, Junction-to-Air	P_D $R_{\theta JA}$ P_D $R_{\theta JA}$ P_D $R_{\theta JA}$	625 200 625 200 520 240	mW $^\circ\text{C/W}$ mW $^\circ\text{C/W}$ mW $^\circ\text{C/W}$
Operating Junction Temperature	T_J	+150	$^\circ\text{C}$
Operating Ambient Temperature MC34064 MC33064 NCV33064	T_A	0 to +70 -40 to +85 -40 to +125	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$

1. ESD data available upon request.

ELECTRICAL CHARACTERISTICS (For typical values $T_A = 25^\circ\text{C}$, for min/max values T_A is the operating ambient temperature range that applies [Notes 3 and 4] unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
-----------------	--------	-----	-----	-----	------

COMPARATOR

Threshold Voltage					V
High State Output (V_{in} Increasing)	V_{IH}	4.5	4.61	4.7	
Low State Output (V_{in} Decreasing)	V_{IL}	4.5	4.59	4.7	
Hysteresis	V_H	0.01	0.02	0.05	

RESET OUTPUT

Output Sink Saturation ($V_{in} = 4.0\text{ V}$, $I_{Sink} = 8.0\text{ mA}$) ($V_{in} = 4.0\text{ V}$, $I_{Sink} = 2.0\text{ mA}$) ($V_{in} = 1.0\text{ V}$, $I_{Sink} = 0.1\text{ mA}$)	V_{OL}	- - -	0.46 0.15 -	1.0 0.4 0.1	V
Output Sink Current (V_{in} , $\overline{\text{Reset}} = 4.0\text{ V}$)	I_{Sink}	10	27	60	mA
Output Off-State Leakage (V_{in} , $\overline{\text{Reset}} = 5.0\text{ V}$)	I_{OH}	-	0.02	0.5	μA
Clamp Diode Forward Voltage, Pin 1 to 2 ($I_F = 10\text{ mA}$)	V_F	0.6	0.9	1.2	V

TOTAL DEVICE

Operating Input Voltage Range	V_{in}	1.0 to 6.5	-	-	V
Quiescent Input Current ($V_{in} = 5.0\text{ V}$)	I_{in}	-	390	500	μA

- Maximum package power dissipation limits must be observed.
- Low duty cycle pulse techniques are used during test to maintain junction temperature as close to ambient as possible.
- $T_{low} = 0^\circ\text{C}$ for MC34064 $T_{high} = +70^\circ\text{C}$ for MC34064
-40 $^\circ\text{C}$ for MC33064 +85 $^\circ\text{C}$ for MC33064
-40 $^\circ\text{C}$ for NCV33064 +125 $^\circ\text{C}$ for NCV33064
- NCV prefix is for automotive and other applications requiring site and change control.

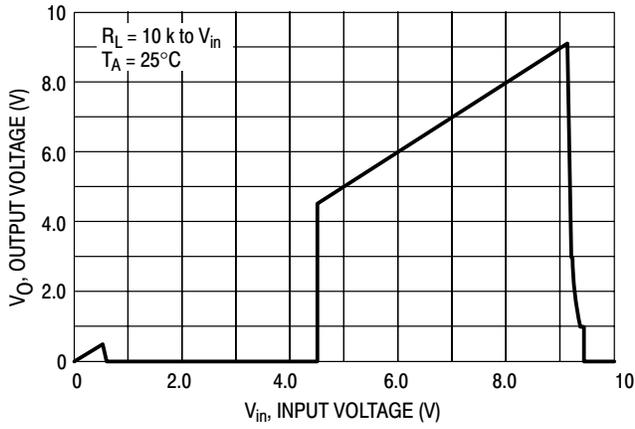


Figure 2. Reset Output Voltage versus Input Voltage

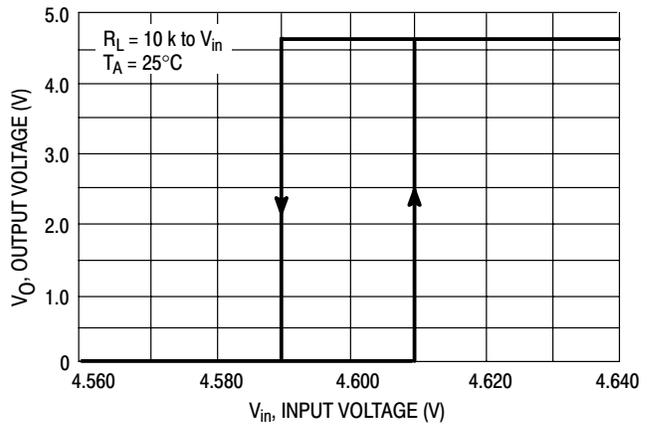


Figure 3. Reset Output Voltage versus Input Voltage

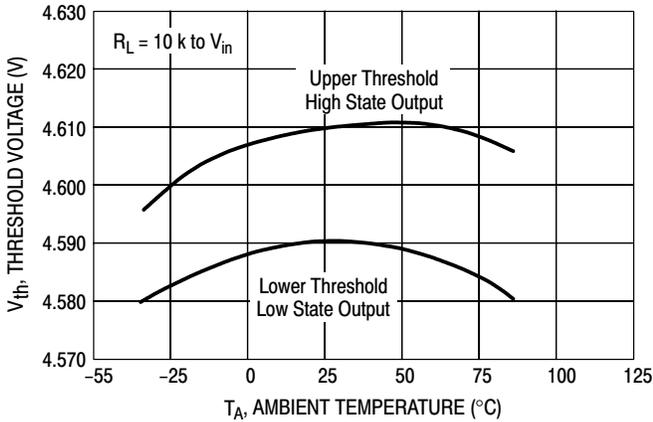


Figure 4. Comparator Threshold Voltage versus Temperature

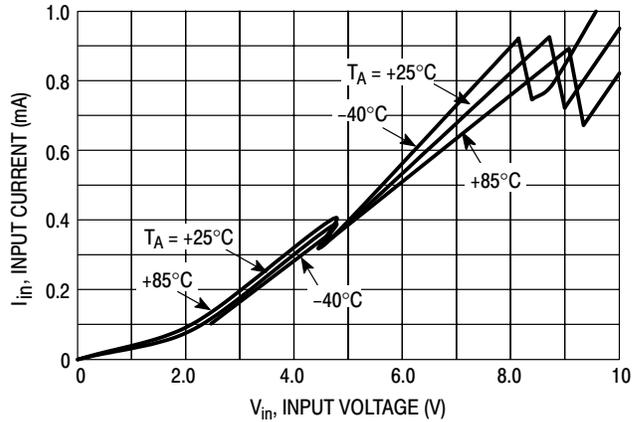


Figure 5. Input Current versus Input Voltage

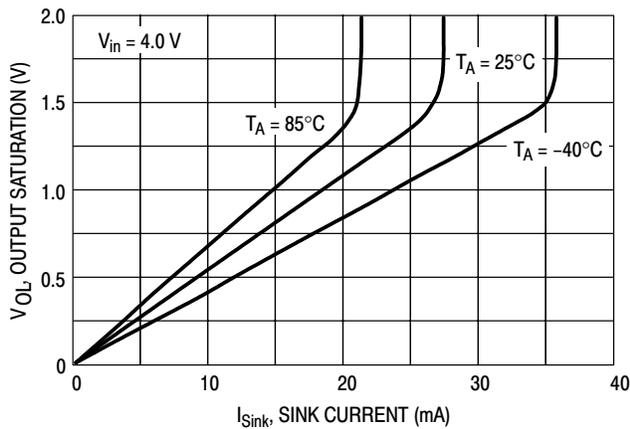


Figure 6. Reset Output Saturation versus Sink Current

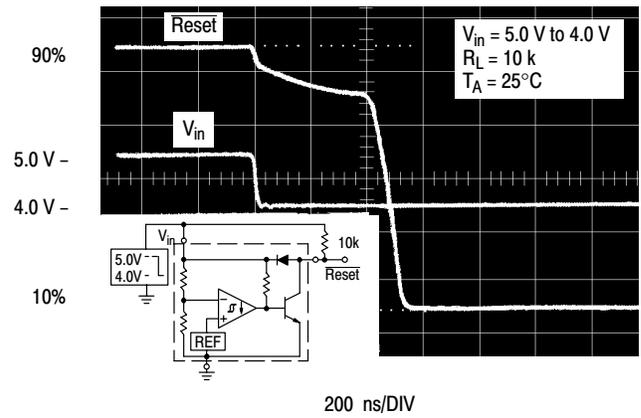


Figure 7. Reset Delay Time

MC34064, MC33064, NCV33064

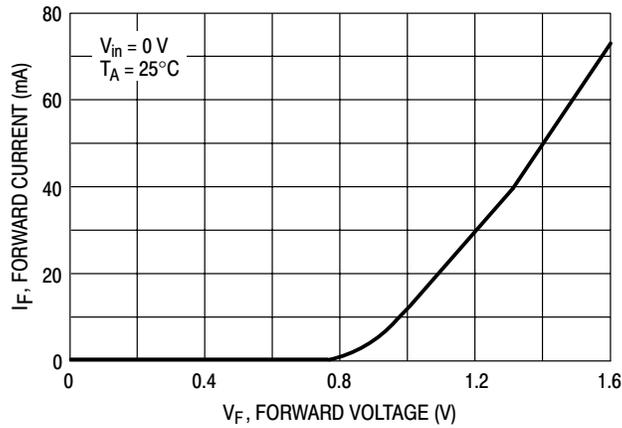


Figure 8. Clamp Diode Forward Current versus Voltage

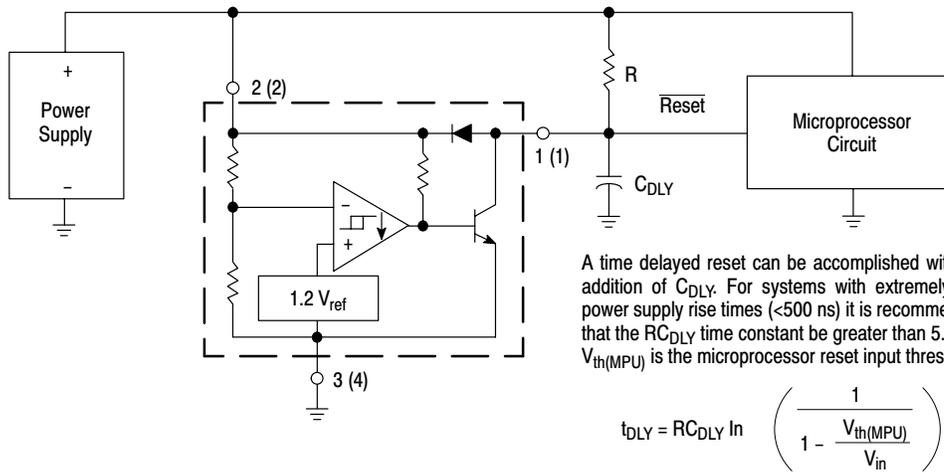


Figure 9. Low Voltage Microprocessor Reset

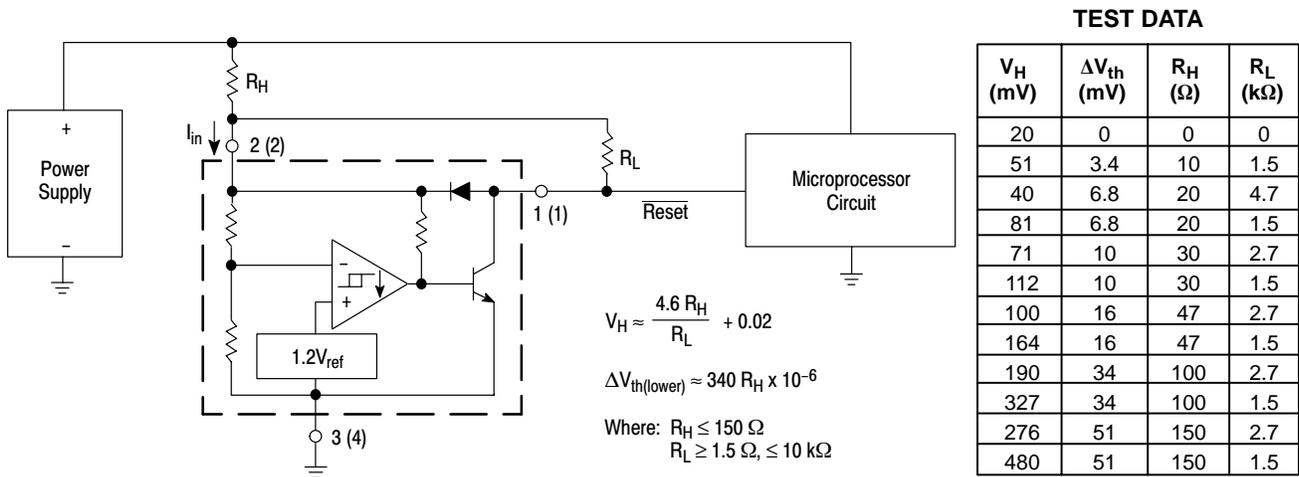


Figure 10. Low Voltage Microprocessor Reset with Additional Hysteresis

MC34064, MC33064, NCV33064

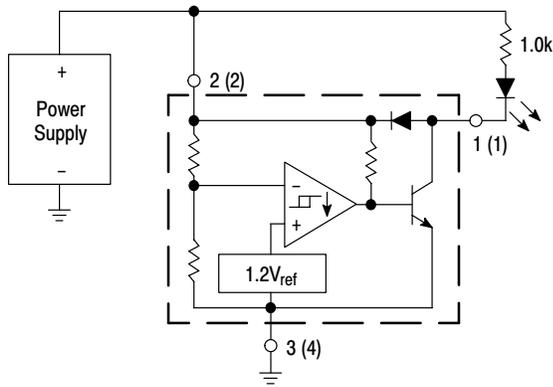


Figure 11. Voltage Monitor

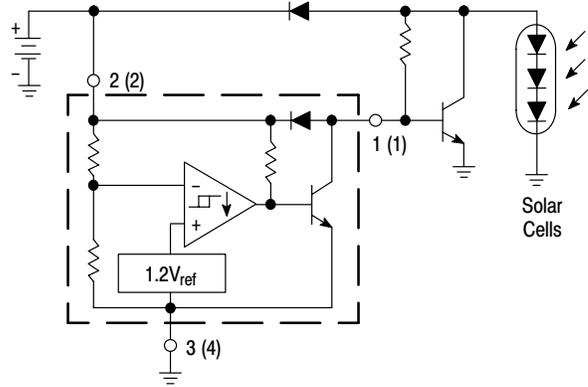
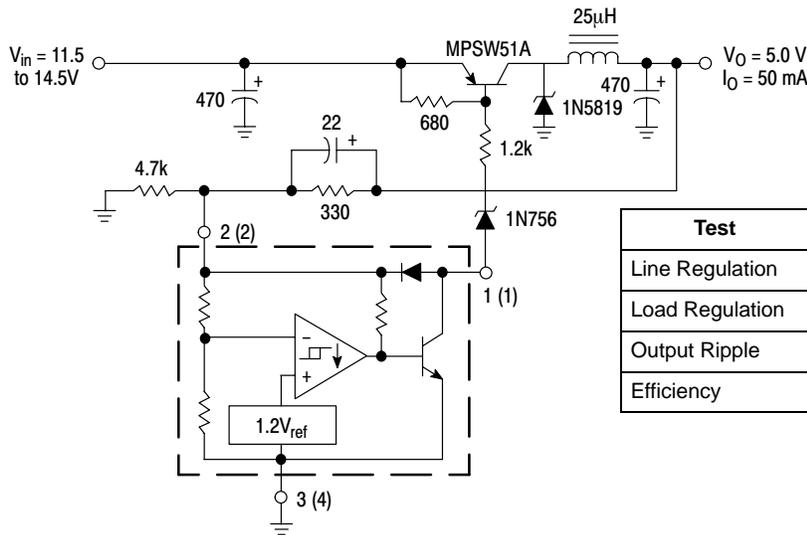
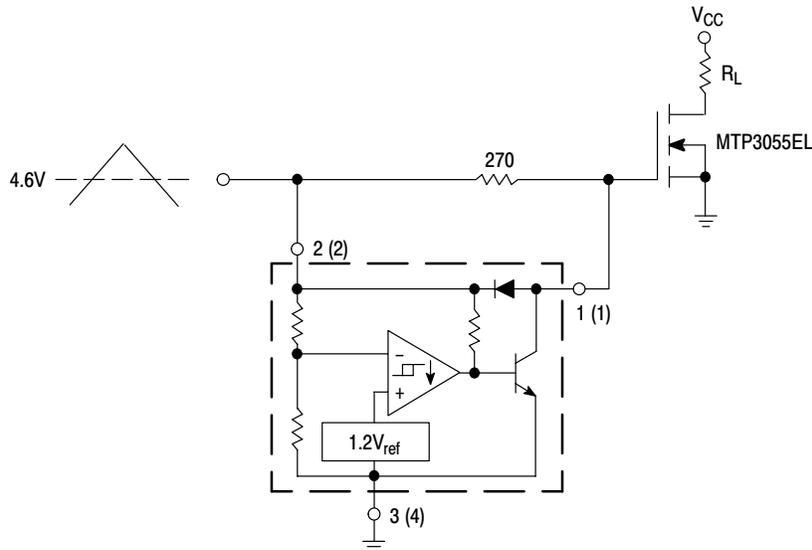


Figure 12. Solar Powered Battery Charger



Test	Conditions	Results
Line Regulation	$V_{in} = 11.5 \text{ V to } 14.5 \text{ V}, I_O = 50 \text{ mA}$	35 mV
Load Regulation	$V_{in} = 12.6 \text{ V}, I_O = 0 \text{ mA to } 50 \text{ mA}$	12 mV
Output Ripple	$V_{in} = 12.6 \text{ V}, I_O = 50 \text{ mA}$	60 mVpp
Efficiency	$V_{in} = 12.6 \text{ V}, I_O = 50 \text{ mA}$	77%

Figure 13. Low Power Switching Regulator



Overheating of the logic level power MOSFET due to insufficient gate voltage can be prevented with the above circuit. When the input signal is below the 4.6 V threshold of the MC34064, its output grounds the gate of the L² MOSFET.

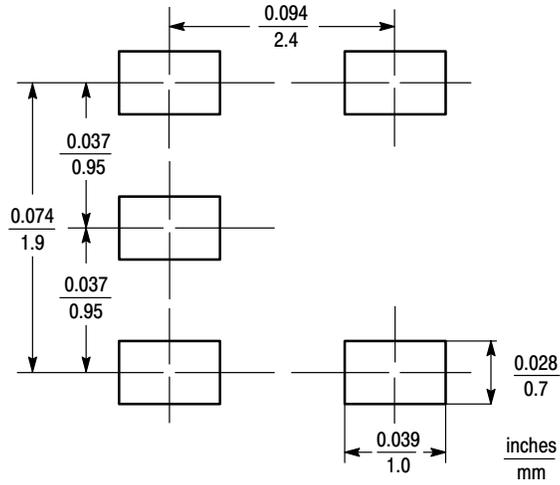
Figure 14. MOSFET Low Voltage Gate Drive Protection

MC34064, MC33064, NCV33064

MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

Surface mount board layout is a critical portion of the total design. The footprint for the semiconductor packages must be the correct size to insure proper solder connection

interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.



TSOP-5
(Footprint Compatible with SOT-23-5)

MC34064, MC33064, NCV33064

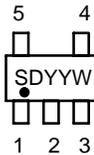
ORDERING INFORMATION

Device	Operating Temperature Range	Package	Shipping
MC34064D-005	$T_A = 0^\circ\text{C to } +70^\circ\text{C}$	SO-8	98 Units / Rail
MC34064D-5R2		SO-8	2500 Units / Tape & Reel
MC34064DM-5R2		Micro8	4000 Units / Tape & Reel
MC34064P-005		TO-226AA	2000 Units / Bag
MC34064P-5RA		TO-226AA	2000 Units / Tape & Reel
MC34064P-5RP		TO-226AA	2000 Units / Ammo Pack
MC34064SN-5T1		TSOP-5	3000 Units / Tape & Reel
MC33064D-005	$T_J = -40^\circ\text{C to } +85^\circ\text{C}$	SO-8	98 Units / Rail
MC33064D-5R2		SO-8	2500 Units / Tape & Reel
MC33064DM-5R2		Micro8	4000 Units / Tape & Reel
MC33064P-005		TO-226AA	2000 Units / Bag
MC33064P-5RA		TO-226AA	2000 Units / Tape & Reel
MC33064P-5RP		TO-226AA	2000 Units / Ammo Pack
NCV33064D-5R2*	$T_A = -40^\circ\text{C to } +125^\circ\text{C}$	SO-8	2500 Units / Tape & Reel
NCV33064P-5RA*		TO-226AA	2000 Units / Tape & Reel
NCV33064P-5RP*		TO-226AA	2000 Units / Ammo Pack

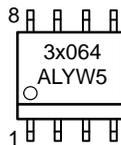
*NCV33064: $T_{low} = -40^\circ\text{C}$, $T_{high} = +125^\circ\text{C}$. Guaranteed by design. NCV prefix is for automotive and other applications requiring site and change control.

MARKING DIAGRAMS

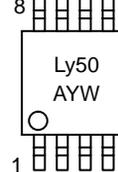
**TSOP-5
SN SUFFIX
CASE 483**



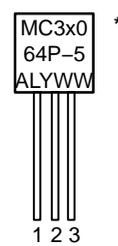
**SO-8
D SUFFIX
CASE 751**



**Micro8
DM SUFFIX
CASE 846A**



**TO-226AA
P SUFFIX
CASE 29**

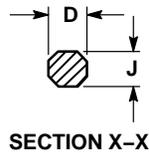
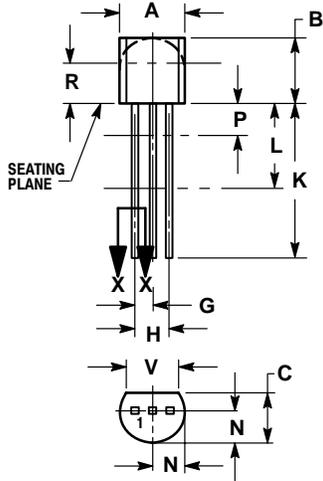


SDY = Device Code
 x = 3 or 4
 y = I or C
 A = Assembly Location
 WL, L = Wafer Lot
 YY, Y = Year
 WW, W = Work Week

*This marking diagram also applies to NCV33064P.

PACKAGE DIMENSIONS

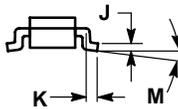
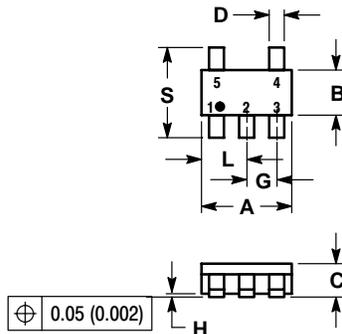
P SUFFIX
 PLASTIC PACKAGE
 CASE 29-11
 (TO-226AA)
 ISSUE AL



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
 4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---

SN SUFFIX
 PLASTIC PACKAGE
 CASE 483-02
 ISSUE C



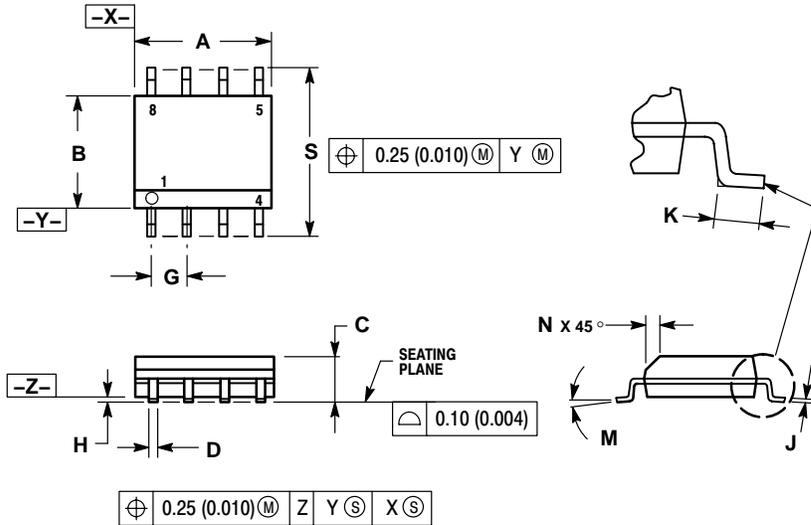
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
 4. A AND B DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.90	3.10	0.1142	0.1220
B	1.30	1.70	0.0512	0.0669
C	0.90	1.10	0.0354	0.0433
D	0.25	0.50	0.0098	0.0197
G	0.85	1.05	0.0335	0.0413
H	0.013	0.100	0.0005	0.0040
J	0.10	0.26	0.0040	0.0102
K	0.20	0.60	0.0079	0.0236
L	1.25	1.55	0.0493	0.0610
M	0	10	0	10
S	2.50	3.00	0.0985	0.1181

MC34064, MC33064, NCV33064

PACKAGE DIMENSIONS

P SUFFIX
 PLASTIC PACKAGE
 CASE 751-07
 (SOIC-8 NB)
 ISSUE AA

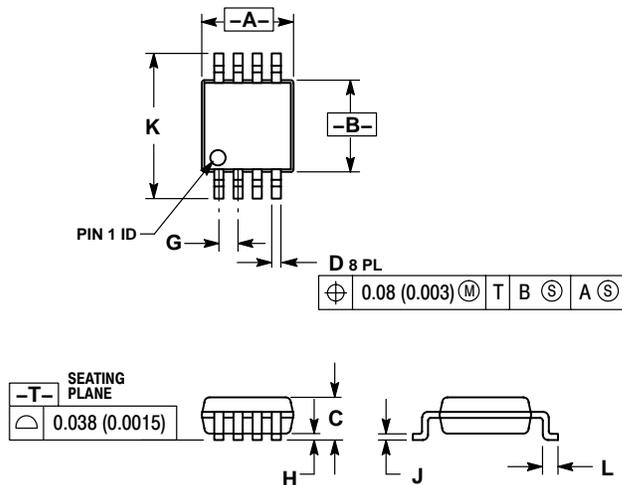


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

DM SUFFIX
 PLASTIC PACKAGE
 CASE 846A-02
 (Micro8)
 ISSUE F



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. 846A-01 OBSOLETE, NEW STANDARD 846A-02.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.90	3.10	0.114	0.122
B	2.90	3.10	0.114	0.122
C	---	1.10	---	0.043
D	0.25	0.40	0.010	0.016
G	0.65 BSC		0.026 BSC	
H	0.05	0.15	0.002	0.006
J	0.13	0.23	0.005	0.009
K	4.75	5.05	0.187	0.199
L	0.40	0.70	0.016	0.028

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer.

PUBLICATION ORDERING INFORMATION

Literature Fulfillment:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free USA/Canada

JAPAN: ON Semiconductor, Japan Customer Focus Center
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

For additional information, please contact your local Sales Representative.